Space Weather Forecast

Issued on Friday, 29 April 2022 at 13:09 Local

This forecast provides a four-day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: G1/G2 Minor/Moderate geomagnetic storm intervals possible in first half of forecast period. Gradually reducing likelihood of Moderate-class X-ray flares (R1/R2 Radio Blackouts).

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity rose to moderate in the past 24 hours, with a solitary long-period moderate class flare observed at 29/0730UTC. This feature appeared to emanate from a now-faded sunspot in the northwestern quadrant. This was preceded by movement in a 'filament' (arc of plasma) to the immediate southwest, visible in ground-based near-infra red imagery, and was roughly coincident with a much more energetic 'filament lift off' (a potential source of Coronal Mass Ejections (CMEs)) from a similar location. The result of this event is now beginning to show on satellite imagery and will be analysed in due course. If two CMEs were indeed emitted, early imagery suggests the former is very likely to have been subsumed in the latter, with only one in evidence leaving the sun.

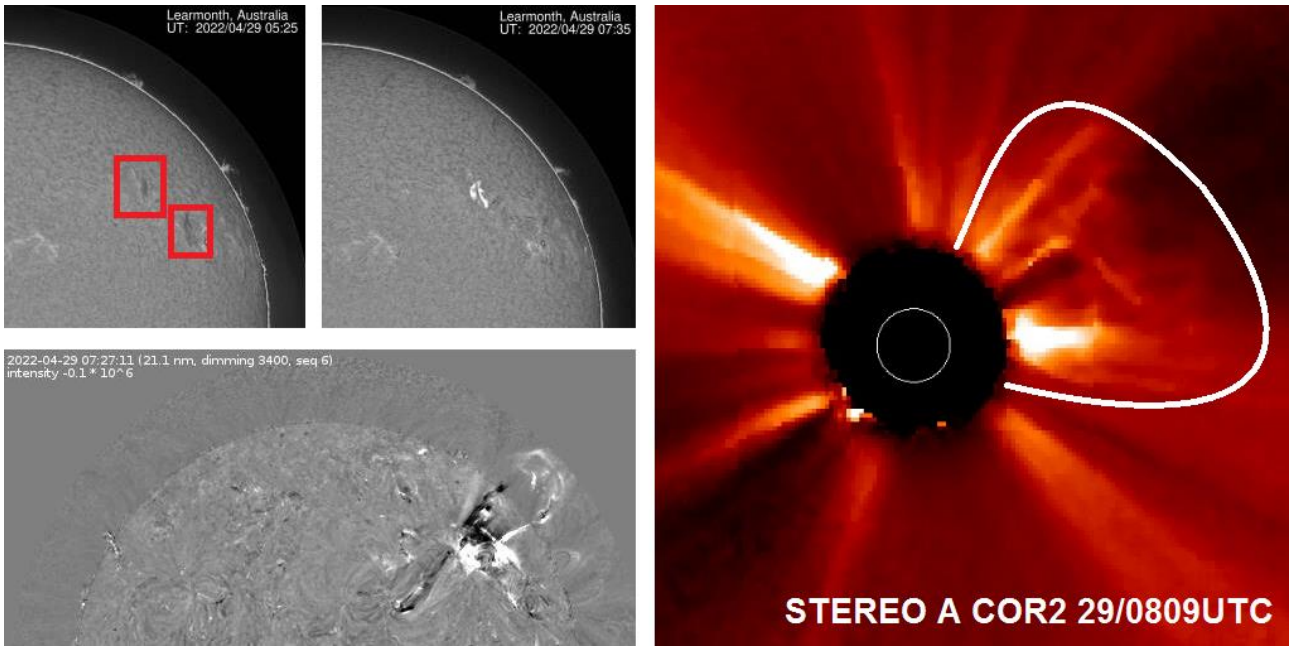

Figure 1: Imagery related to solar activity during the UTC morning of 29 April. Clockwise from top left: ground based near-infra red imagery showing boxed red 'filaments' that later disappeared (centre top); satellite imagery of the resulting CME from the perspective of a satellite around 30 degrees behind Earth in the track of its orbit; and view of the CME in extreme UV (lower left, processing courtesy of SIDC ROB).

There are currently up to eight sunspot regions on the sun, with these broadly falling into three

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main 'areas'. First amongst these is the aforementioned active northwestern quadrant in general, which contains many spots with a history of moderate and some strong flares (in the past fortnight).

Secondly, the central portion of the sun contained two smaller magnetically bipolar regions which were otherwise unremarkable. Finally, the southeastern quadrant was the preserve of up to four very minor groups, all unipolar or simple dipoles, again with no notable growth or flaring.

Solar Wind / Geomagnetic Activity: The solar wind has in retrospect been determined to be symptomatic of connection to a coronal hole fast wind which may have occurred as early as the UTC afternoon of Wednesday 27 April.

The solar wind speed was elevated in the past 24 hours, however the number of particles and their associated magnetic field were both relatively small scale and unvarying to give a net result of geomagnetic activity below Minor Storm G1 throughout.

Energetic Particles / Solar Radiation: No solar radiation storms were observed in the 24 hours, despite the western solar hemisphere Moderate-class flare.

Four-Day Space Weather Forecast Summary

Solar Activity: There is a daily slight chance of further Moderate-class X-ray activity, although this is expected to wane during the second half of the forecast period, perhaps significantly so by the very end of the four days as recent active regions successively depart for the sun's far side.

Solar Wind / Geomagnetic Activity: The geomagnetic forecast carries relatively high uncertainty. Current modelling suggests the potential arrival of a CME which left the Sun around 27/1450UTC in the next 18 hours or so. A CME from 28 April may catch up with this first CME to complicate its influence. There is otherwise the one unassessed CME, with updates to follow. Provisionally, this final feature appears to have originated little too far west and north on the sun to be a significant risk to Earth.

Contrary to earlier guidance, Earth is now thought very likely to be seeing the influence from a coronal hole fast wind, with this likely to have already peaked in terms of intensity, from here waning later in the UTC weekend. This is the only coronal hole to feature in the forecast.

All considered, there is a chance of G1/Minor Storm intervals on day one (Friday 29 April), should the impending CME(s) arrive ahead of forecast. During 30 April, geomagnetic activity is likely to result in G1/Minor Storm, with a chance of G2/Moderate Storm intervals, easing back to increasingly quiet conditions from Sunday 01 May and into the new working week in a (by this time) nominal solar wind environment.

Energetic Particles / Solar Radiation: Solar radiation should remain near background levels through the next four days, with the current slightly raised daily chance of breaching S1 falling with the passing of the most significant front-sided sunspot regions.

Issued by Met Office Space Weather Advisor, Tel: +44 (0) 330 135 4254 Email: moswoc@metoffice.gov.uk

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Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	40	70	10	1
Strong	G3	No	1	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	No	20	20	10	10
Very Active	R3 to R5 X	No	5	5	1	1

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	No	5	5	2	2
Very Active	≥ S3 *	No	1	1	1	1

* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)

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